

ABSTRACT OF THE DISCLOSURE

A probe instrument using room-temperature sensor(s) that can measure variations in magnetic susceptibilities. The instrument has sufficient resolution to monitor paramagnetic materials in a human body, such as iron in a human liver, by noninvasively examining patients with iron-overload diseases. The instrument includes room temperature magnetic sensors, and detects the sample, that is, the tissue response to an alternating current field applied by an applied field coil. The applied field coil dimensions are chosen so that the applied field is optimized for maximum response from the liver while minimizing the effects due to the overlying abdominal tissue and at the same time not unduly increasing the sensitivity of the instrument to the lung. To overcome variations in the sensor output due to fluctuations in the applied field, change in the ambient temperature and mechanical relaxation of the instrument, the sensor-sample distance is modulated. The detector assembly is oscillated while the examined patient remains stationary. An improved water-bag technique is employed to eliminate background tissue response. The detector assembly forms part of a probe instrument for performing noninvasively the paramagnetic concentration of a patient.